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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/667,297	09/22/2000	Eric R. Lovegren	R11.12-0701	1706

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EXAMINER

WEST, JEFFREY R

ART UNIT PAPER NUMBER

2857

DATE MAILED: 03/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/667,297

Applicant(s)

LOVEGREN ET AL.

Examiner

Jeffrey R. West

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 April 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 and 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. The examiner requests copies of the relevant pages of the following reference, listed in the Information Disclosure Statement (PTO-1449) filed on April 17, 2001, as it is considered pertinent to the examination of the application:

Fundamentals of Applied Electromagnetics, 1999 Edition, Prentice Hall,
Fawwaz T. Ulaby.

Drawings

2. The drawing in Figure 1 is objected to because it does not have sufficiently descriptive labels, specifically the box labeled "24". Blank boxes in drawings should be labeled descriptively unless it is a well-known component. Appropriate correction is required.

3. The drawing in Figure 5 is objected to because step "66" describes setting a first dielectric parameter and step "76" describes setting a second dielectric parameter. These steps are not in accordance with the specification on page 16, line 4 and page 17, lines 22-23 respectively.

4. The drawing in Figure 2 is objected to as failing to comply with 37 CFR 1.84(p)(5) because it includes the following reference sign not mentioned in the description: "42". A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description,

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are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

5. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "dielectric constant calculator", as mentioned in claims 16 and 20, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Specification

6. The disclosure is objected to because of the following informalities:

On page 16, line 27, the "control loop" is incorrectly labeled "36" instead of "26" as it is labeled on page 7, line 2, and in Figures 1 and 2.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

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The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

8. Claims 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,198,424 to Diede et al.

Diede discloses a radar level transmitter for providing level detection of materials in a container comprising an antenna (column 3, lines 28-30), a transceiver coupled to the antenna to transmit a microwave pulse and produce a signal representing reflected wave pulses (column 3, lines 41-44 and 64-67), a microprocessor system coupled to the transceiver that controls the transceiver and processes the signal (column 3, lines 13-26), a threshold calculation module, executable by the microprocessor system, to calculate first or second threshold values as a function of the amplitude and properties of the materials (column 4, lines 13-22), a level calculation module to calculate the level of a first or second material interface using the signal and threshold values (column 3, lines 10-16 and column 4, lines 61-65), an input/output port on the transceiver to transmit the level of first material interface (column 2, lines 46-52 and column 3, lines 19-24), and a dielectric constant calculator on the transmitter to calculate, and provide to the

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threshold calculator, the dielectric constant of a material as a function of the amplitude and first reflected pulse (column 3, lines 10-13, column 4, lines 54-58, and column 5, lines 14-27).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1, 2, 4, 5, 7, 8, 10-13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,198,424 to Diede et al. in view of U.S. Patent No. 5,609,059 to McEwan.

As noted above, Diede teaches many features of the claimed invention including the idea of setting the threshold value for a pulse as a function of the pulse's reflected amplitude (column 4, lines 19-22), and detecting first, second, and fiducial reflected pulses, using a different threshold value for each of the pulses (column 4, lines 12-19 and Figures 4 and 5), wherein a first reflected pulse corresponds to the portion of a transmitted microwave pulse reflected at a first material interface between air and a first product (column 5, lines 39-42), having a dielectric constant calculated by a dielectric constant calculator (column 4, lines 54-58), a second reflected pulse

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corresponding to the portion of a transmitted microwave pulse reflected at a first material interface between the first product and a second product (column 5, lines 42-47), and a fiducial pulse corresponding to the portion of a transmitted microwave pulse reflected at the fiducial interface between the antenna, or launch plate, and the air around the antenna (column 3, lines 48-51).

Diede also teaches calculating the amplitude of the first reflected pulse as a function of the dielectric of a second material and the amplitude of a reference waveform (column 5, lines 14-25), in this case the fiducial pulse (column 5, lines 51-52), and with respect to claim 16, Diede teaches the aforementioned method of threshold calculation along with the older conventional method of first calculating the threshold value as a function of a user-entered dielectric constant (column 1, lines 56-62 and column 4, lines 22-23), but does not teach incorporating the dielectric parameter of a first material and a correction factor in calculating the first reflected pulse amplitude.

McEwan teaches an electronic multi-purpose material level sensor that determines the level of a product by measuring the time delay between transmitted and received reflected pulses (column 6, lines 22-28) wherein the magnitude of the reflected pulse is calculated as a function of the dielectric constant of the first material, air, and the dielectric of the second material (column 6, lines 29-34), and all the reflected pulse measurements are corrected by taking the measurements between the fiducial pulse and the

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reflection pulse relative to the antenna, or launcher plate, rather than to the transceiver (column 6, lines 49-53).

It would have been obvious to one having ordinary skill in the art to modify the invention of Diede to include incorporating the dielectric parameter of the first material and a correction factor in calculating the first reflected pulse amplitude, as taught by McEwan, because the combination would provide more accurate measurements, by taking into account variance in the dielectric of the first material, air, instead of using calculations that assume it to be 1, as is a common practice, and further, as suggested by McEwan, the combination would have reduced or eliminated errors and drift introduced by the cable (column 6, lines 49-53).

With respect to claims 4 and 7, as noted above, Diede teaches detecting each of the pulses using a threshold value, and the method of setting a threshold value for each pulse as a function of the pulse's reflected amplitude. It would have been obvious to one having ordinary skill in the art to include the correction factor and the dielectric of the first material, as taught by McEwan, with the method of calculating a pulse amplitude, as taught by Diede, for each of the first, second, and fiducial pulses to obtain the threshold values, because the combination would provide the suggested accuracy to each of the pulses amplitude calculations, rather than just for the first pulse.

11. Claims 3, 6, 9, 14, and 15 are rejected under 35 U.S.C. 103(a) as being

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unpatentable over Diede et al. in view McEwan, and further in view of U.S. Patent No. 5,500,649 to Mowrey et al.

As noted above, Diede and McEwan teach many of the features of the claimed invention, including preventing attenuation error in the reflected pulse measurement (McEwan, column 5, lines 15-21) and insuring that the threshold value remains at a valid level by applying a range factor (McEwan, column 4, lines 35-50) but does not teach setting a threshold value as a function of an offset value.

Mowrey teaches a method and apparatus for monitoring the thickness of a coal rib comprising a transmitter that transmits radio waves toward the coal rib, a receiving means that receives a portion of the reflected energy from the air-coal interface, and a processor means that determines the thickness of the coal rib by calculating the difference between the transmitting and reflecting times (column 2, line 60 to column 3, line 19). Mowrey further teaches adjusting the radar signal, by an offset value, to change the wave-detecting threshold value to an acceptable level (column 7, line 65 to column 8, line 10).

It would have been obvious to one having ordinary skill in the art to modify the invention of Diede and McEwan to include setting a threshold value as a function of an offset value, as taught by Mowrey, because as suggested by Mowrey, the combination would have provided a method of obtaining accurate results by calibrating the transmitter and receiver based on the current operating conditions (column 8, lines 6-10).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

U.S. Patent No. 3,832,900 to Ross teaches an apparatus and method for measuring the level of a contained liquid.

U.S. Patent No. 5,656,774 to Nelson et al. teaches an apparatus and method for sensing fluid level.

U.S. Patent No. 4,489,601 to Rao et al. teaches an apparatus and method of measuring the level of a liquid.

U.S. Patent No. 4,838,690 to Buckland et al. teaches a simultaneous bi-directional optical time domain reflectometry method.

U.S. Patent No. 5,726,578 to Hook teaches an apparatus and methods for time domain reflectometry.

"Measurement of the Dielectric Properties of Materials by Using Time Domain Reflectometry", *7th IEEE Instrumentation and Measurement Technology Conference Record*, 1990, Nozaki, R. et al.

"Determination of Volumetric Water Content in Lossy Geophysical Media Using Time Domain Reflectometry", *Antennas and Propagation Society International Symposium Digest*, Volume 3: 1997, Oswald, B. et al.

"Continuous Measurement Of Cerebral Water Content By Time Domain Reflectometry", *Proceedings of the Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Volume 13: 1991, Kramer, G.G et al.

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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (703)308-1309. The examiner can normally be reached on Monday thru Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703)308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

jrw
March 8, 2002


MARC S. HOFF
SUPERVISORY PATENT EXAMINER
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